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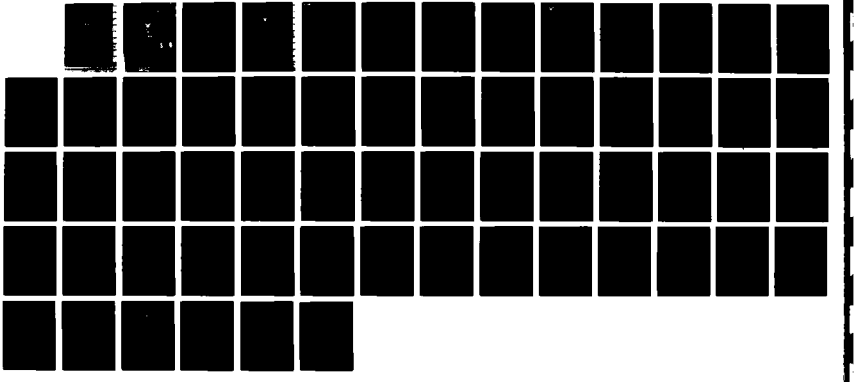

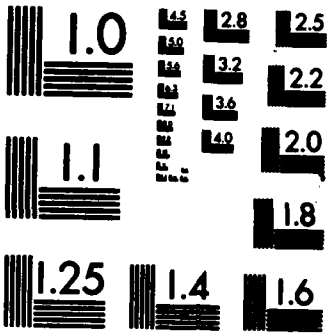

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STUDENT REPORT

US SPACE COMMAND--DOES IT SUPPORT NATIONAL MILITARY SPACE REQUIREMENTS?

MAJOR JAMES R. HAMBY 87-1065
MAJOR ODELL A. SMITH, JR.

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TITLE US SPACE COMMAND--DOES IT SUPPORT NATIONAL MILITARY SPACE REQUIREMENTS?

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Describes US Space Command organization. Analyzes the major factors that led to the formation of the command: US national space policy, US military space doctrine, space technology and US dependence on space systems, and the Soviet space threat. Evaluates how well US Space Command organization supports the major factors that led to its formation.

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PREFACE

The motivation to accomplish a project of this nature was generated as both authors performed duties with the Air Force Space Command. In addition, Major Hamby served as the executive officer for Vice Admiral William Ramsey, the Deputy Commander in Chief of the US Space Command, at the time of the formation of the command. This first hand experience provided ample evidence of the need for US Space Command staff and project officers to understand the influence of several major factors in the formation of the command. The authors would like to thank Major Larry Roseland of the Air Command and Staff College for his support, advice, and guidance on this project. The support of the project sponsor, Vice Admiral William Ramsey, and his staff is greatly appreciated, and we hope that the fruits of our labor will be beneficial to those current and future officers of US Space Command who must ensure that it measures up to the calling.

ABOUT THE AUTHOR

Major James R. Hamby, United States Air Force, helped write this paper while a student at Air Command and Staff College. Born in Junction City, Kansas, Major Hamby attended Oklahoma State University where he received a Bachelor of Science degree in Electrical Engineering. His military experience includes serving as communications engineer and Aide-de-Camp at Headquarters Southern Communications Area, Air Force Communications Command and commanding communications squadrons at Charleston Air Force Base, South Carolina, and Pope Air Force Base, North Carolina. Major Hamby also served as a staff officer at the Air Force Systems Integration Office and Air Force Space Command and as executive officer to the Deputy Commander in Chief of US Space Command. He completed Squadron Officer School and Air Command and Staff College by correspondence, was awarded the Air Force Communications-Electronics Professional Achievement Award, and holds Masters degrees in Business Administration from Webster University, Missouri and Electrical Engineering from the Air Force Institute of Technology residence school, Wright Patterson Air Force Base, Ohio where he was a distinguished graduate.

Major Odell Alden Smith, Jr., United States Air Force, coauthored this project while a student at Air Command and Staff College. Born in Spring Lake, North Carolina, Major Smith attended North Carolina State University where he received a Bachelor of Science degree in Electrical Engineering. He entered the Air Force in 1973 and served as a communications-electronics engineer with a communications group at McClellan Air Force Base, California, a combat communications group at Lindsey Air Station, West Germany, and with a tactical air control wing at Shaw Air Force Base, South Carolina. He also served at the Air Force Space Command as a communications branch chief responsible for systems supporting space, missile warning, and air defense missions. He completed Squadron Officer School in residence, and Air Command and Staff College by seminar. He obtained a Masters degree in Systems Management from the Air Force Institute of Technology's School of Systems and Logistics where he was a distinguished graduate.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

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REPORT NUMBER 87-1065

AUTHOR(S) MAJOR JAMES R. HAMBY
MAJOR ODELL A. SMITH, JR.

TITLE US SPACE COMMAND--DOES IT SUPPORT NATIONAL MILITARY SPACE REQUIREMENTS?

I. Purpose: To analyze US Space Command's organization and determine if it supports the major factors that led to its formation.

II. Background: Many factors influenced the establishment of the United States Space Command. Chosen for this study effort were four factors that each provided a major influence on the formation of the US Space Command. The factors considered were: 1. US national space policy, 2. US military space doctrine, 3. US dependence on space systems and space technology, and 4. the Soviet space threat.

III. Discussion of Analysis: Each of the four factors was analyzed to determine their influence on the formation of the US Space Command. The analysis revealed requirements from each factor which contributed to the need for a unified space command. These requirements were then compared with the organization to determine how well they are supported.

IV. Findings: US national space policy was found to experience a shift in direction just prior to 1980. This shift in policy was based on the need to use space to enhance national security, and redefined what it meant to use space for peaceful purposes.

CONTINUED

The shift led to the requirements of assured access, survivability, and support to the Strategic Defense Initiative, reflecting a movement in the US space program toward increased military influence on activities in space. As such, a unified space command was needed to support this new policy. The next analysis was of US military space doctrine. Military space doctrine requires the operational employment of space systems for space control and to support military forces. Space control means to ensure access to and operations in space while denying these capabilities to the enemy. Space control and the operational employment of forces were operational missions that, by law, had to be assigned to a unified command. Next analyzed was US dependence on space systems and space technology. Improvements in space technology provided improved capabilities for space systems. As the use of these systems grew, US dependence on them increased to the point that the systems became vital to the national security of the United States. US dependence on space systems was recognized by the Commanders in Chief of the unified and specified commands, as well as by US Government leaders. The concern was over the vulnerabilities of US space systems and the fragmentation of US space efforts, critical issues in light of US dependence. Support was therefore provided for the establishment of a unified operational command that could address these issues. The Soviet space threat was the final factor analyzed. The Soviet space program is overwhelmingly military in nature. Over 90 percent of their space systems are used to support the military. Soviet military space doctrine requires Soviet military superiority in outer space, denial of space to other states, and space-based support for Soviet combat forces. The Soviet's also have the world's only operational antisatellite weapon system. Recognition of the Soviet space program as a significant and growing military threat and the need to develop an organization to counter that threat influenced the establishment of US Space Command. An organization was needed that could monitor the Soviet space order of battle, control the US space order of battle, and perform the space control mission. These are warfighting missions and needed to be assigned to a unified rather than a service space command.

CONTINUED

III. Conclusions: The formation of US Space Command has solved the present US military space organizational requirements. All of the factors examined in this report support the need for a unified space command. As presently organized the command should do an excellent job of supporting these factors except in the areas of ballistic missile defense and military astronaut management.

IV. Recommendations: The ballistic missile defense mission should be assigned to US Space Command along with the forces necessary to accomplish this mission. Also, an organization should be established as part of US Space Command to manage military astronauts to fly future military shuttle missions.

Chapter One

INTRODUCTION

In the 1980s, there have been rapid changes in US military space programs and organizations. During this time, the organizational focus has been on establishing a broader organizational structure for space, that was more responsive to rapid technology developments, a recognition of the US military's growing use of and dependence on space systems, and an expanding Soviet space threat. Existing theater organizations could not provide the necessary military space organizational structure due to the global nature of space operations (56:2). Consequently, Air Force Space Command was activated in September 1982, followed by Naval Space Command in October 1983, and finally, United States Space Command in September 1985 (23:1; 28:2; 31:12). Many factors relating to US national interests, objectives, policies, and capabilities were instrumental in shaping the new US Space Command. The command is now just over a year old, and an analysis of the factors that led to its establishment would be useful in determining how well the command is supporting US military space requirements.

The purpose of this project is to perform that analysis. It examines the primary factors that led to the formation of US Space Command and analyzes how well the command is supporting those factors. The intent is not to present a detailed history of the evolution of US Space Command, as that task will be left to the historians. The study, however, provides a high level account of the primary factors that led to the command's formation. The factors examined are: (1) US national space policy, (2) US military space doctrine, (3) space technology and US dependence on space systems, and (4) Soviet space threat.

The report is organized as follows. Chapters Two and Three describe how the evolution of US space policy and military space doctrine led to the formation of US Space Command. Chapter Four discusses US space programs, capabilities, and technologies that made US Space Command necessary. Next, Chapter Five describes the Soviet space program, capabilities, and military space doctrine and how the Soviet space threat influenced the formation of US Space Command. Then, Chapter Six presents a description of US Space Command, its organization, missions, service components, and relationships with other commands and organizations.

Finally, Chapter Seven examines how well US Space Command supports our national military space requirements, by determining how well it meets the requirements identified in Chapters Two through Five.

Chapter Two

UNITED STATES NATIONAL SPACE POLICY

United States space policy has, since its infancy, been guided by a commitment to the use of space for peaceful purposes. However, an increased emphasis on the use of space to enhance national security was evident in President Reagan's announcement of his national space policy on 4 July 1982. The new policy and its subsequent impact on our national space program played a significant role in the eventual establishment of the United States Space Command. This chapter will address that role. A shift in emphasis occurred prior to 1982 that is best understood through a review of early US space policy. This chapter will review the history of US space policy, and then address space policy as stated during the first term of the Reagan Administration. Finally, it will address the influence of space policy under the Reagan Administration on the establishment of the US Space Command.

US SPACE POLICY IN REVIEW

> Space policy defines in broad terms the basic goals and principles of the US space program. Space policy is shaped by national interests and security objectives and constrained by fiscal considerations and US objectives under international law. Perhaps policy formulation is the most critical element of the national planning process because it provides the framework for the subsequent development of military space strategy and the identification of future system requirements (22:7).

Eisenhower

The foundation of United States space policy was laid during the presidency of Dwight D. Eisenhower, and his original guidance continues to be a part of our evolving space policy. His overriding desire was that space be used for peaceful, scientific purposes. He was motivated toward this end by his concern for "open skies" reconnaissance on the Soviet Union and an appreciation of the potential of the satellite to meet this need (48:2-3). One result of President Eisenhower's emphasis on space for peaceful purposes was the separation of United States military and civilian space programs at the outset.

The launching of Sputnik I in October 1957 sped up the formulation of US space policy, and efforts to organize the US space program were increased. In April 1958, President Eisenhower recommended to Congress that an organization be established for the US national space program. He advocated a civilian agency which would "emphasize the concern of our nation that outer space be devoted to peaceful and scientific purposes" (48:5). Congress responded with the first official national space policy, the National Aeronautics and Space Act (Space Act), which became law on 29 July 1958. This policy was in accordance with President Eisenhower's earlier direction, emphasizing that US activities in space should be devoted to peaceful activities that would benefit all mankind. The Space Act established the National Aeronautics and Space Administration (NASA), a civilian agency, to conduct the United States space program. NASA would control all activities except those "associated with the development of weapon systems, military operations, or the defense of the United States" (48:6). The Defense Department would be responsible for these activities. The Space Act also called for sustaining the role of the United States as "a leader in aeronautical and space science and technology" and encouraged "cooperation with other nations and groups of nations" (48:6).

President Eisenhower recognized the need for a military space program which would be responsible for "space activities peculiar to or primarily associated with military weapons systems or military operations" (48:5). He also wanted the overall responsibility for the military space program to remain at the Department of Defense (DOD) level, versus placing it with any particular service (1:43). Overall responsibility was originally given to the Advanced Research Projects Agency (ARPA), but later all projects were transferred back to the individual services. Organization of the US space program, both civilian and military, was the subject of many proposals and experienced many changes. In 1959, Admiral Arleigh Burke, Chief of Naval Operations, proposed that a unified space command be created. The Air Force opposed such a move and Secretary of Defense McElroy eliminated the possibility with his statement in September 1959 that the "establishment of a joint military organization with control over operational space systems does not appear to be desirable at this time" (1:44). It would take over 25 years of space activity and space policy development before such an organization would be realized.

Following the Space Act, President Eisenhower further influenced space policy through the National Security Council statement, NSC 5918, issued in 1960. The Space Act and NSC 5918, together, provided a foundation for both United States space policy and for many international space agreements and treaties. The four basic tenets of space policy that emerged under Eisenhower--emphasis on the peaceful use of space, separation of civilian and military space programs, international cooperation,

and the role of the US as a leader in space--remain as significant elements of US space policy. The military significance of space was also recognized, but military activities were restricted to support activities such as reconnaissance, early warning, and communications.

Kennedy, Johnson, Nixon, and Ford

President Kennedy's space goals were primarily influenced by his interest in international prestige, though he continued to support the basic tenets established by Eisenhower. In his 25 May 1961 state of the union message he stated, "... I believe that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to earth. No single space project in this period will be more impressive to mankind..." (33:404). President Kennedy implemented one other major change in the US space program. President Eisenhower had supported the use of satellites for reconnaissance, but permitted information about such programs to be made available to the public. President Kennedy, very aware of the importance of reconnaissance satellites, was concerned about the Soviet response to them. This caused him to eliminate all publicity about US reconnaissance satellite operations in order to reduce their visibility. All military launches became classified and by 1962 an information "blackout" about such programs was in effect. The goal of a man on the moon by the end of the decade and the conduct of all reconnaissance satellite programs in secret were the major contributions of the Kennedy Administration. For the military, a Department of Defense Directive was issued in 1961 that permitted the military services to conduct preliminary research in the use of space technology. However, the Air Force was to be responsible for the further research, development, testing, and engineering of all Department of Defense space projects (48:15-16).

President Lyndon B. Johnson continued the program to land a man on the moon. However, his administration saw other influences emerge that would affect US space policy. Three international space treaties were signed during the Johnson administration: the Outer Space Treaty prohibiting the orbit of weapons of mass destruction, the Astronaut Rescue and Return Agreement, and the Nuclear Test Ban Treaty which banned nuclear explosions in outer space. Another significant influence on the US space program was President Johnson's emphasis on the use of space technology to help build the "Great Society". He saw space as one of the areas where American scientists should prioritize their research efforts to meet society's needs. With this emphasis, the US space program became oriented toward commercial applications and domestic benefits. This had a significant long range effect. The result was that improved meteorological and communications capabilities were developed for use by both the

civilian and military sectors. In the long run, the US defense establishment would come to be very dependent on these developing technologies. One other factor affected the US space program appreciably during the Johnson administration. Funding levels had to be cut for space programs due to the Vietnam War and growing domestic funding needs. However, the commitment to landing a man on the moon remained the focus of Johnson's space policy. The Air Force was also allowed to pursue the Manned Orbiting Laboratory (MOL) project due to the potential it offered in surveillance.

The administrations of Presidents Nixon and Ford were also characterized by lower funding levels for NASA and the Department of Defense space efforts. In the first formal space policy statement since the Eisenhower administration, Nixon proposed two general directions for the US space program: "exploration to acquire scientific knowledge and practical application to benefit man" (48:28). He also stated that "space expenditures must take their proper place within a rigorous system of national priorities" (34:250). The initial result of this policy direction was a delay in the Skylab Space Station project, a trimming down of the Apollo Lunar Program, and suspension of the Space Shuttle proposal (48:28). Less than two years later, however, Nixon approved proceeding with the Skylab project and the Space Shuttle. These were justified because they were "aimed not at advancing exploration of deep space but at gaining in space new knowledge for the improvement of life here on earth" (35:1158). This was a continuation of Johnson's original policy and was evident in a message to Congress on 16 March 1972, in which President Nixon said, "We are reorienting our space program to focus on domestic needs--such as communications, weather forecasting, and natural resource exploration" (35:418-419). The result was improvements in earth resource and weather satellites for civilian uses and improvements in overhead reconnaissance, navigation, communication, and early warning for military uses (48:31). The Space Shuttle program also would provide jobs, and an economical method to launch, service, and retrieve space hardware. In addition it had the interest of the Department of Defense. This program would eventually have a significant impact on the nation's space program (22:12). The general result of the Nixon-Ford years was a loss of momentum for the nation's space program.

A TURNING POINT UNDER CARTER

President James E. Carter, upon taking office, asked for a review of space policy. He was concerned with the interaction of the various agencies involved in the space program. Consequently, he had the National Security Council Policy Review Committee (PRC) examine existing policies and recommend future

direction for space policy. The results of the PRC review were two Presidential Directives (PD) 37 and 42 that would refocus the direction of US space policy. PD-37 supported the original direction provided by the Space Act of 1958 and stated two US space objectives: "to advance the interests of the United States through exploration and use of space, and, through cooperation with other nations, to ensure the freedom of space for all activities which enhance the security of mankind" (48:35). These objectives were based on principles of US space policy that had been in existence, but classified until this time. These principles included the right to acquire data from space, the identification of space systems as national assets, the right of access to and operation in space without interference, the development and operation of space sensing systems, and the use of military space support systems to strengthen national defense (37:1-3). PD-37 also included three specific military measures to be addressed. These three would indicate a significant shift was occurring in US space policy. The first effort was to be the establishment of a program for "identifying and integrating appropriate civil and commercial resources into military operations during national emergencies declared by the President" (48:36). The second effort would be the pursuit of survivability in space systems "commensurate with the planned need in crisis and war and the availability of other assets to perform the mission" (37:1-3). The last effort directed was a "vigorous pursuit" of antisatellite capabilities, not prevented by agreements, including "an integrated warning, notification, verification, and contingency reaction capability which can effectively detect and react to threats to United States space systems" (37:1-3).

The pursuit of these three measures reflected the tremendous dependence of the United States on space capabilities and were major alterations to US space policy. They revealed the gradual evolution in thought about space, from its early role as a force enhancer to a potential new role as a warfighting medium. This shift was a turning point in US space policy, and a change that would be further solidified during the next administration. This shift was the first step along the path to establishing a defense organization for space, the unified United States Space Command. PD-42, issued four months after PD-37, addressed only the civilian portion of the US space program. It did not provide specific long range goals, but did stress an increasing use of the Space Shuttle. It also reiterated the need to use space to improve life on earth, and supported international cooperation in space.

SPACE POLICY UNDER THE REAGAN ADMINISTRATION

The administration of President Ronald Reagan would have a significant influence on both the US space program and US space policy. This influence would occur through several major statements addressing the new national direction in space, which had been initiated under the Carter Administration. President Reagan first announced his national space policy at ceremonies welcoming home the fourth space shuttle crew on 4 July 1982. This policy was contained in National Security Decision Directive 42 (NSDD-42). The basic goals, initiated by Eisenhower, were to strengthen national security, maintain US leadership in space, obtain scientific and economic benefits through space, and promote international cooperation in space. A major new goal of expanding private investment and involvement in civil space and space-related activities was added to these (48:43).

The directive contained principles that, for the most part, were those first provided in President Carter's PD-37. These included the space sovereignty issue, the right to acquire data, space systems as national assets, and international cooperation. NSDD-42, however, contained some specific policy guidance of a national security nature. This guidance amplified on the military measures originally stated by President Carter, and included the following. The US will conduct space activities deemed necessary for national security, including the functions of command and control, communication, navigation, environmental monitoring, warning, surveillance, and space defense (48:46). Survivability of space systems will be pursued, commensurate with their planned use in crisis and conflict, with the threat, and with the availability of other assets to perform the mission (22:14). The US will proceed with developing an antisatellite (ASAT) capability, with the goal of operational deployment. The purpose of this capability would be to deter threats to US and allied space systems and, within the limits of international law, to deny any adversary the use of space-based systems to support hostile military forces (48:46). The Reagan guidance also strongly supported the Space Shuttle, and gave priority to national security missions.

Although the Reagan policy did not make drastic changes to the Carter space policy, it confirmed the new direction of US space policy, that being the use of space to enhance national security. The President's science advisor, George Keyworth, stated that the policy represented:

> ...the outcome of an enormous struggle among nine agencies with frequently conflicting interests; it also represents a small but important shift in the direction of the United States space program toward increased military control of activities in space and increased involvement of the private sector in space ventures (48:42).

President Reagan followed up his national space policy with his Strategic Defense Initiative announcement on 23 March 1983. This announcement was again addressed in NSDD-85, dated 25 March 1983. The Strategic Defense Initiative (SDI) has the goal of eliminating the threat of attack by strategic nuclear missiles. President Reagan's SDI program was to perform studies and research on those technologies that would contribute to a system capable of intercepting and destroying ballistic missiles in flight (48:48). Space-based systems would inherently play a role in such a capability. This fact contributed to the increased recognition of space as a warfighting medium, providing military responsibilities that would drive the requirement for a unified space command.

On August 15, 1984, President Reagan provided a national space strategy. It tied together previous space policies and directives into one coherent document addressing the total US space program. The strategy made the Space Shuttle the primary launch system for national security and civil missions, directed that the shuttle be fully operational by 1988, tasked NASA to achieve full cost recovery operations by Oct 1, 1988, and tasked the Department of Defense (DOD) and NASA to look at launch vehicle technology for use in the post-1995 time frame (18:139). The strategy then addressed the civil, commercial, and national security space programs. Guidance for DOD would follow the policy provided in 1982, with the addition of support to the SDI. The DOD would maintain assured access to space by supplementing the shuttle with expendable launch vehicles (ELV). It would also "provide for the survivability of selected, critical national security space assets to a degree commensurate with the value and utility of the support they provide" (18:141). The DOD would ensure that its space and space-related programs would support the Strategic Defense Initiative. It should also "provide a strong emphasis on advanced technology to respond to changes in the environment, to improve U.S. space-based assets, and to provide new capabilities that capitalize on technological advances" (18:141).

A change in emphasis of space policy had occurred during the Carter and Reagan administrations. This was evident in President Reagan's national space policy, strategic defense initiative, and national space strategy. The shift was in what was meant by the use of space for peaceful purposes. Peaceful would now include activities to directly support national defense. This shift in policy would be a major influence on the establishment of the US Space Command.

US SPACE POLICY AND THE US SPACE COMMAND

Due to tremendous technological advances in the space arena and changes in the Soviet threat, US space policy was destined to evolve to its emphasis on national security. The capabilities now provided by space systems were vital to the support of US operational forces. Space systems had gradually developed from a research and development function to the point where they were operational systems performing critical functions for national defense. The employment of space systems had become so integrated into operational forces, that they could no longer be considered as only force enhancers. To reflect this dependence on space, US space policy evolved to address the issues of assured access and survivability enhancement for space assets. In support of these, the DOD was given priority on Space Shuttle launches, and was required to have expendable launch vehicles that could provide backup space access for critical national systems. The critical importance of space reflected its likely use to support warfighting.

With the Strategic Defense Initiative, the space medium took on an even clearer role as a warfighting medium. The purpose of space would continue to be peace, but space would fulfill this role with activities and functions supporting national defense. With the acceptance of this shift in US space policy, American leadership, in and out of the military, began to call for a unified space command to direct military space activities. General James V. Hartinger, first commander of the Air Force Space Command, was a proponent of a unified space command. In 1983, he stated that, "an organization to provide an operational focus is needed, preferably a unified command. The operational need for a joint service command existed before the President's Strategic Defense Initiative--it is even more important now" (10:22). The need prior to SDI, was the consolidation of control of space assets to support operational missions, and the need to effect space control when in the national interest.

Strong congressional support also existed for a unified space command. In late 1983, 53 members of the House of Representatives sent a letter to President Reagan proposing a unified command. The letter was initiated by Congressman Ken Kramer of Colorado. In order to achieve strategic defense through SDI, the Congressmen proposed that:

> ...a major part of the task ahead is the establishment of the organizational structure and dedicated scientific, technical, and military team to implement your initiative. We believe a unified space command to coordinate and direct the space activities of all branches of the armed forces to be a vital element of this structure (38:E5881).

At the same time, the Joint Chiefs of Staff (JCS) developed a recommendation that a unified command for military activities in space be formed. A unified command would control military satellites and the military uses of the Space Shuttle. It would control other systems and weapons that might be developed for war in space, and it would be a key organization in the development of the SDI (38:E5881). The Secretary of Defense, Caspar W. Weinberger, also supported this recommendation and took it to President Reagan in January of 1984. After some months, the recommendation was approved and the announcement of the activation of a new unified space command was made on November 30, 1984. According to the announcement, a unified space command "will better serve US interests and the needs of our allies worldwide by providing an organizational structure that will centralize operational responsibilities for more effective use of military space systems" (36).

US space policy evolved from stressing the peaceful use of space to emphasizing the role of space in national defense. President Reagan's National Space Strategy, in turn, directed how space would be used to support national security. According to Vice Admiral William E. Ramsey, the first deputy commander in chief (CINC) of the US Space Command, "the national space strategy was the moving force behind the formation of the United States Space Command" (57:10). The National Space Strategy was a codification of all previous space policy, policy which was clearly one of the most prominent influences on the establishment of the US Space Command.

Chapter Three

UNITED STATES MILITARY SPACE DOCTRINE

At the time the United States Space Command was established, military space doctrine was undergoing a significant change in direction. Its evolution was being influenced by the issue that space systems should be operationally employed for space control in addition to being operationally employed to support other forces. This need could not be supported by the existing Air Force and Naval Space Commands, for reasons that will be explained later. This change in space doctrine was, therefore, one of the factors that led to the establishment of the US Space Command. This chapter addresses the influence space doctrine had on the establishment of the US Space Command. It will first address some characteristics of space that make space unique and space doctrine a necessity. It will then look at the issue of space control as an element of space doctrine. Next it will address the requirement to operationally employ forces in space. Finally, it will examine the relationship between space doctrine and the formation of US Space Command.

SPACE - ITS CHARACTERISTICS AND RESULTANT CAPABILITIES

The term "aerospace" first appeared in AFM 1-2, USAF Basic Doctrine, in 1959. AFM 1-1, Basic Aerospace Doctrine defines aerospace as "the total expanse beyond the Earth's surface; it is the multidimensional operating environment where Air Force forces can perform all of their missions" (39:2-2). This definition of aerospace infers a continuous and homogeneous operational medium; such is not the case.

The current version of AFM 1-1 states that: "Each force derives its intrinsic capabilities from the characteristics and medium in which it operates" (39:1-3). The aerospace has two distinct regions, air and space, each with unique characteristics (49:24). A practical definition of space would be, "the environment above the earth's atmosphere where the principles of aerodynamics applied through vehicle control surfaces no longer can be used for operational control" (49:24). Space has its own particular characteristics that make it a unique medium or environment. The capabilities of space systems, that are based on the characteristics of the medium and evolving technologies for the medium, were the basis for evolving US space doctrine.

The most significant characteristic of space is that space systems must be deployed in predictable orbits. Once an orbit is chosen, the characteristics of the orbit (inclination, degree of circularity, and time to circle the planet) are fairly well fixed (19:26). It is this characteristic that provides the unique capabilities of space systems.

One of the major capabilities offered by space systems is that of global coverage. Space vehicles in high altitude orbits have line-of-sight view of large portions of the Earth. Satellites in low orbits have narrower fields of view but revisit areas more frequently since they transit the Earth faster. Several satellites in low orbits can provide continuous coverage of large portions of the Earth. This "global coverage" is valuable for such functions as communications, surveillance, navigation, and meteorology where the ability to see, or be seen from, large expanses of the Earth's surface is important (15:37). The accomplishment of these four functions via space systems has grown greatly over the years, and so has US dependence on them.

Free access to space and free overflight in space are also important capabilities. Free access means that any nation can place space systems into orbit. Free overflight means that there are no political or physical limitations to peaceful use of space above any nation (49:29). Free overflight is critical to surveillance. "Space systems have produced a revolution in obtaining information about the enemy" (9:20). Space surveillance is used extensively for both arms control treaty verification and strategic warning of ballistic missile attack.

Another characteristic is the effective range of weapons in space. Due to the emptiness of space there is no atmospheric attenuation. Weapons using directed-energy or nuclear radiation would be effective over much greater distances than within the atmosphere. Also, without the effects of atmospheric drag, tremendous kinetic energies could be attained by very small masses travelling at speeds impossible in other mediums. These various capabilities would be particularly useful for space-to-space weapons (15:38). Another characteristic of space systems due to orbital motion and the absence of drag is that of indefinite flight. A satellite, once placed in a high enough orbit, can remain there for thousands of years (19:26). This capability means that space systems can be placed into orbit in a standby mode and activated at some later time. Such a technique could be used to deceive the enemy.

Space systems are also limited by their characteristics. Because orbits are fairly fixed and very predictable, satellites can easily be found and tracked by the enemy. Maneuver, though not impossible, requires great fuel supplies. Also, since space systems are placed in specific orbits to accomplish certain missions, maneuver is not usually practical. Space systems have

also begun to cluster in certain types of orbits related to the missions being performed. For example, geosynchronous orbiting satellites are useful for communications because they remain essentially fixed above a certain point on the Earth's surface. Sun-synchronous, polar orbits are best for meteorology and surveillance, while Molniya orbits are best for communications in the northern polar regions. Since certain orbits are more valuable than others, space has terrain-like features (15:38). The first nation to occupy the more valuable orbits will have a potential advantage over other nations. This feature and the other characteristics of space influence a nation's space doctrine.

SPACE DOCTRINE

Doctrine has been defined as "what is officially believed and taught about the best way to conduct military affairs" (58:87). Air Force Manual 1-1, Basic Aerospace Doctrine, provides aerospace doctrine. It addresses doctrine based on the airpower characteristics of speed, range, and flexibility (39:2-2). The characteristics of space previously discussed include global coverage, free access and overflight, weapons range, indefinite flight, and terrain-like features. The characteristics of space and the systems operating there are very different from the characteristics of systems operating in the air. For this reason, space requires its own doctrine, based on its own characteristics, capabilities, and technologies. Even though the US had operated in space for many years, US space doctrine was not formulated until 1982. This was due to the gradual evolution of the US space program from a primarily research and development stature to one of being very dependent on operational space systems.

The cornerstone of US space doctrine was laid in 1982 when the first version of AFM 1-6 Aerospace Basic Doctrine, Military Space Doctrine was published. AFM 1-6 addresses both space support missions and space warfighting missions. Support missions include force enhancement (space systems that enhance the effectiveness of land, sea, air, and space forces) and space support activities (deploying and sustaining space systems) (40:8). Potential warfighting missions include systems deployed in or through the space medium that have the potential of performing military operations (40:8). This initial version of AFM 1-6 addresses warfighting because it is guided by the need for the US to:

> ...provide forces for controlling space operations and gaining and maintaining space superiority. These concepts are aimed at achieving freedom of actions in space for friendly forces while denying or deterring enemy actions contrary to national interests (40:iv).

A stronger wording of this concept, also included in AFM 1-6, is that the US should achieve "freedom of actions in space for friendly forces while denying it to the enemy" (40:9). As this guidance indicates, a key doctrinal element now exists which requires the US to support a mission of controlling space when and as required.

SPACE CONTROL

Space control is addressed by Lt Col David Lupton (USAF Retired) as one of four schools or perspectives on space doctrine (15). Although AFM 1-6 asserts that the "basic philosophy of space doctrine is to preserve free access to, and transit through, space for peaceful purposes" (40:iv), it clearly supports the guidance that the "United States will conduct those activities in space that it deems necessary to its national security" (40:3). United States space doctrine, presented in AFM 1-6, is best described by Lt Col Lupton's space control school.

The control school looks at space via an analogy with airpower and seapower. Just as control of the air and sea is vital for deterring and winning wars, so is control of space. Space must be controlled to control the mediums beneath it. In addition, there are space lanes of communications that must be controlled. These relate to the most valuable terrain areas discussed previously. The space control school also states that space control will be "coequal with air and sea control in future wars" (15:40). The space control school anticipates that space warfare will eventually become very similar to air warfare. The first objective is to establish some measure of control in the environment. Control might be established as needed, where needed or on an ultimate control basis (i.e., space superiority) (15:41). The first priority is to achieve space control, with a shift to supporting terrestrial forces only after the necessary control is achieved. "The primary function of space war is to ensure that friendly terrestrial forces have the benefits derived from the environment and that enemy forces are denied those benefits" (15:41). Such an approach is consistent with the guidance provided in AFM 1-6.

AFM 1-6 provides the initial US space doctrine, which includes the support missions of force enhancement and space support activities, and the potential warfighting mission of space control. Support missions are being accomplished by various DOD and NASA organizations. At the time AFM 1-6 was written, there was no organization that had the responsibility nor the capability to control space. In order to support the mission of space control and to better accomplish the support missions, it was recognized that the US would need an organization to operationally employ its space systems.

OPERATIONAL EMPLOYMENT

The US had been operating systems in space for over 25 years. It had begun with primarily research and development systems operated by research and development organizations. As the use of space systems grew over the years, so did the dependence on them. Communications, navigation, surveillance, and meteorological capabilities provided by space systems had become vital to the employment of air, land, and sea forces. As stated by Vice Admiral Ramsey, Deputy CINC US Space Command, "previously our space doctrine had not been required to address the employment of space systems which had matured through research and development to the point where they were operational assets" (57:10). US space systems had become operational assets and "there was no organization within our U&S (unified and specified) command structure....through which space systems could be operationally employed" (54:2). This dilemma was explained by General Robert T. Herres, the first CINC of the US Space Command:

> When our military forces proceed to conduct large-scale operations throughout the world, it becomes necessary to uniquely control the satellites supporting those forces and scrupulously allocate this support on a case-by-case basis among the commanders in chief employing the supported forces. Up to now, we have accomplished this delicate force management by implementing special or ad hoc procedures. But as our senior leadership in the Department of Defense proceeded to establish these ad hoc arrangements for every crisis and every exercise, it became clear in a very concrete way, what men of vision had been claiming for years. It became clear that not only was the managerial wheel being reinvented at tedious intervals; but they realized that a major conflict would so increase the scope and scale of that task that an ad hoc arrangement would likely be inadequate to effectively deal with the demands placed upon it (50:18).

As described in Chapter One, an Air Force Space Command was created in 1982, followed by a Naval Space Command in 1983. But neither of these organizations could fulfill the role of operationally employing US space systems for either support missions or space control. United States Code (U.S.C.), Title 10 required that the operational control of forces had to conform to the joint DOD structure of unified and specified commands. The operational employment of our operational space assets required an organization that could legally employ those assets, the US Space Command. AFM 1-6 indicates that the need for an operational space organization to support a doctrine of space control was understood. It states that, "an operational command responsive to the direction of the National Command

Authorities and employed by a unified or specified command is likely to be an end result . . ." (40:10).

Such an operational organization would also provide for the centralized control of US space systems in support of warfighting or support missions. Lt Col Lupton's description of the space control school suggests that the "characteristics of the forces dictate that a single operational entity exercise centralized control of forces" (15:44). In addition, centralized control would improve the conduct of space support missions as explained by Lieutenant General Richard C. Henry, USAF (Ret):

> One of the most striking aspects of all our space systems is that they service more than one user. Decentralized control of space would be ineffective today for the same reasons that decentralized control of air power in World War II permitted conflicting requirements on limited assets (9:19).

SPACE DOCTRINE AND THE US SPACE COMMAND

US space doctrine, as set forth in AFM 1-6, was a major factor in the establishment of the US Space Command. The doctrine called for the US to support both space support missions and potential warfighting (space control) missions. These operational missions could not be conducted by existing organizations, but by law needed to be conducted by a unified or specified command. The US Space Command was established to fulfill this role.

As stated in the command's mission statement, "Space control is the command's warfighting mission. It includes ensuring access to and operations in space without interference, and when directed, denying an adversary the use of space-based systems that provide support to hostile military forces" (54:3). Space control is a major challenge. It is reasonable to say that space control is not an available capability today. However, US efforts are being guided by this basic space doctrine. The US currently has an antisatellite system in development, which if it becomes operational, will be under the control of the US Space Command. The US has undertaken the strategic defense initiative, a technology research program that receives some influence from the US Space Command due to their relationship. The command is also responsible for directing space support operations for assigned systems, and operating JCS-designated space systems in support of the National Command Authorities, Joint Chiefs of Staff (JCS), and the U&S commands (54:2). To accomplish these, the US has structured the US Space Command to perform space operations and the transition is well underway. US space doctrine, a key factor in the establishment of the US Space Command, is now being fulfilled by this organization.

Chapter Four

US DEPENDENCE ON SPACE SYSTEMS AND SPACE TECHNOLOGY

The influences of space doctrine and space policy on the establishment of the US Space Command have been addressed. But as doctrine and policy for space developed, they were heavily influenced by technology. Technologies that have been applied to space systems have taken advantage of the physical principles governing orbiting spacecraft to yield tremendous capabilities. The orbit of a space vehicle high above the Earth allows it to "see" large portions of the Earth's surface. Choosing particular orbits determine which portions of the Earth's surface a satellite can see. This ability has proven very useful in the areas of surveillance and reconnaissance, communications, navigation, and meteorology. Even from the early space efforts, as technological capabilities improved in these areas, they drove the need for and direction of policy and doctrine. Technology influenced the formation of the US Space Command because, as systems and capabilities grew, US dependence on these systems increased and they became a critical element in the US defense posture. As shown in previous chapters, this dependence in turn affected policy and doctrine to the point that a unified space command was established. Technology, as a key factor in the formation of US Space Command is the focus of this chapter. This focus is oriented around the capabilities that technology offered for space systems, the increased use of these systems, and the growth of dependence on these systems for national security. It will then show how this dependence influenced the establishment of a unified space command.

CAPABILITIES, INCREASED USE, AND DEPENDENCE

Surveillance

Since a satellite can be placed in an orbit that allows it to view denied portions of the Earth's surface, surveillance was a natural resulting capability. The vantage point of a satellite enables the verification of treaty compliance and the detection of launch or detonation of nuclear missiles. No other technological innovation is legally or physically able to provide such capabilities as those available through satellites.

The United States developed systems that could take advantage of this surveillance capability offered by satellites. Surveillance was the primary impetus behind the early defense-oriented space programs. An example of this kind of system is the one providing early warning against a nuclear ballistic missile attack. The performance of this early warning function is vital to the security of the United States. This operational mission impacts the function of every unified and specified command, and was a consideration in the formation of the unified US Space Command. Another surveillance function provided by satellites is verification of treaty agreements. As technology has improved, newer satellites have longer lives and provide much greater capabilities. All services now depend on these reliable capabilities in accomplishing their missions. A centralized organization for control and management of these assets was necessary to provide proper support.

Communications

Communications capabilities were, for years, limited by the principles that govern atmospheric radio frequency propagation. Transmission in the high-frequency (HF) range would propagate over long distances, even around the world. But the capacity of an HF channel was limited normally to one voice user, with no data capabilities. In addition, reliability and quality were poor. The range of frequencies that would propagate over these distances was also limited. On the other hand, transmission in the microwave radio frequency range provided large capacities (100-6000 channels), with very good quality and reliability. But, these tremendous capacities were limited to line-of-sight distances of 30 to 100 miles. With the advent of satellites, it was possible to overcome the difficulties of communications between two points within the Earth's atmosphere. From its position high above the Earth, a satellite can relay information between widely separated points. This meant that high capacity, high reliability, high quality communications could be provided almost unlimited range. Even if high capacity was not needed, reliability and quality were available at very low power levels using a small ground terminal. Space communications technology drastically changed the communications field. It is now possible to have instantaneous communications between almost any two points on or above the Earth's surface. Also, the capability to broadcast from a central point of control to all subordinate units worldwide--in the air, on the land, or at sea--is possible.

The United States developed several space-based communications systems. As these systems improved and capabilities evolved, their use grew from one service or segment of a service to many users throughout the DOD. One such system is the Air Force Satellite Communications (AFSATCOM) System. This system operates in the ultra-high frequency (UHF) band and is survivable against nuclear radiation and jamming (17:16).

Although initial use of AFSATCOM was limited, its capabilities made it useful in satisfying a number of critical communications requirements. It has become a primary element of the Minimum Essential Emergency Communications Network (MEECN), in which it provides direct communications between the National Command Authorities (NCA) and US strategic forces. AFSATCOM is also a primary communications medium for strategic bombers, airborne command posts, strategic command posts, other strategic aircraft, and ballistic missile launch control centers. It would be used in wartime for critical communications. The Fleet Satellite Communications (FLTSATCOM) System uses similar technology and is the Navy's primary communications link to ships at sea. It is evident from the uses of these systems that the systems are critical to national security. This situation developed gradually as users and uses were added to the systems, but the result was the extreme US dependence on these systems. This dependence would play a role in the need for a unified space command.

The Defense Satellite Communications System (DSCS) is another major satellite communications system. DSCS provides high-capacity voice and data connectivity. DSCS also started out with support to a limited number of users. The system was designed to provide common user service for the DOD. However, due to the quality and connectivity that DSCS provided it grew to provide service to a large number of critical mission areas. DSCS supports the Worldwide Military Command and Control System (WWMCCS), NCA, the Diplomatic Telecommunications System (DTS), and the worldwide Defense Communications System. It also carries some surveillance, intelligence, and early warning data, as well as providing specific service to each of the unified and specified commanders in the employment of their respective forces. It currently provides approximately two-thirds of all continental US (CONUS) to overseas military communications. Growth in the use of DSCS occurred over the years as user requirements increased. This eventually led to extreme US dependence on this system as well.

Another important issue in satellite communications is interoperability. Different services had developed capabilities that were very similar, but incompatible with each other. Incompatibilities existed in both the space segments of systems and in the ground terminals. Although this area had been the subject of numerous exercise after-action reports, it was highlighted during the Grenada operation. Units of two different services, using the same satellite, were unable to communicate with each other due to incompatible ground terminals. The need for interoperability in joint operations and reduced duplication of efforts in procurement contributed to the need for a unified space command.

Navigation

The orbits of satellites above the earth also enabled them to provide a navigation capability. Because of their position above the atmosphere, they are able to provide reference signals to passive receivers on Earth. These signals are used to determine the precise location of the receiving unit in any type of weather and on any part of the globe.

Navigation systems were developed very early in the US space program. The Navy Navigation Satellite System (TRANSIT) was the first developed and became operational in 1964 (2:58). TRANSIT was designed to provide navigation support to the Navy's ballistic missile submarines. As the usefulness of TRANSIT was realized, its use spread to other Navy assets as well as commercial shipping. Its use eventually expanded to support all fleet units, providing accurate position information for ships around the world in all weather. As technology improved, a follow-on system was designed that would provide additional, and more accurate, information. This was the NAVSTAR Global Positioning System (GPS). It will "provide reliable and accurate positioning and continuous navigation information in all weather conditions, worldwide, in real time and with maximum antijam capabilities" (5:73). GPS users will be able to determine their position, velocity, and the time to very great accuracies. This will enhance bombing accuracy, submarine-launched ballistic missile accuracy, and ground force maneuvering. Because of miniaturization in electronics and improvements in power supplies, ground terminals for GPS are lightweight and compact. This allows GPS to be used by Naval ships and aircraft, Air Force aircraft, and Army vehicles and soldiers. This has resulted in GPS being considered "the first direct application of space for the fighting elements" (17:17). This direct support of warfighting for all services, and the development of many new weapon systems that would depend on GPS, contributed to the need to establish a unified space command for such a space system.

Meteorology

Satellites also made it possible to observe weather conditions on Earth, and improve the predictions of developing weather patterns. Real-time night and day weather information is extremely valuable to the planning and execution of military operations. For remote and inaccessible areas, satellites provide the only means of meteorological data. Weather satellites are also able to measure a number of other environmental parameters that are useful for military operations. These include ocean surface wind speed, age and thickness of ice, intensity of precipitation, and amount of water and clouds (21:12-9). Meteorological satellites were developed under the Defense Meteorological Satellite Program (DMSP). This program provides

several types of weather information to military users. The system employs visible and infrared imagery to observe cloud patterns and other weather conditions. Real-time night and day observations of weather conditions are possible. These capabilities have made DMSP the "DOD's single most important source of weather data" (6:50). All of the nation's military services are very dependent upon DMSP for this vital source of weather data.

DEPENDENCE, AWARENESS, AND THE US SPACE COMMAND

The capabilities that became available, through technology applied in space, were employed in the functions and systems just discussed. As explained by Major General Thomas C. Brandt, USAF, these "space systems were developed because they were the most cost-effective way of performing a national security function and in some cases offered the only way of performing that function" (6:45). As these systems became operational the number of users began to grow. In addition to the improved capabilities they offered, the reliability and availability of the systems was high. Over the years, the staffs of the various unified and specified commanders made increased use of the systems for operational and exercise support. Operations plans, procedures, and tactics came to rely on the availability and economies provided by these space systems. US space systems, thus, became an integral part of all command and control networks supporting operational forces.

Satellite systems also came to be relied upon for the "high-tech" edge that they provide. In effect, military forces were able to be "multiplied" through the use of space systems. Technology has for many years been the essential element giving US forces the edge against superior numbers of troops and aircraft. This is even more true in space. As stated by Brigadier General Wesley Clark, of the Air Force Space Command, "In short, it's the weapons systems and combat troops who will still have to do the fighting, but it is the space systems which will give them the edge they need to win" (47:20). And by General Robert T. Herres, the first Commander in Chief of the US Space Command, "national security depends on the high tech edge and a big piece of the high tech edge is our exploitation of space for the support of our forces" (53:7). General Herres summed up our dependence on space systems as follows:

> ... our military dependence on satellite platforms to provide our forces with a high tech edge is growing at such a rate and the trend is becoming so well established that I think we have to ask ourselves a question, "Can any adversary engage U.S. ground, naval and air forces and afford not to attempt to neutralize the support our forces would get from space?" (53:7).

The situation of extreme dependence of the US defense posture on satellite systems was recognized in the early 1980s, by the commanders in chief of the various unified and specified commands. There were several issues that highlighted a problem. One was that many of the US military satellite systems were operated by the Space Division of the Air Force Systems Command, a research and development organization. At first, US space efforts were primarily for research and development (R&D). Then, as capabilities began to develop, systems would be placed into operation. Due to the expense of space launches, R&D and operational missions would often share the same payload. This kept Space Division the primary developer, manager, and operator of many space systems long after they were declared operational. There was no operational organization with the mission of controlling operational space systems. With such vital systems being controlled and managed by an R&D organization, there was a lack of responsiveness provided to the unified and specified commanders.

The vulnerabilities of US satellite systems also became known to the unified and specified commanders. The ease with which a system could become overloaded, jammed, affected by loss of a ground station, or even attacked by an antisatellite weapon contributed to this concern. The dependence of US forces on the various space systems, increased the likelihood that space systems would be targets for attack. The role of the Space Division and the awareness of vulnerabilities brought out another issue as explained by General Herres:

> As our worries about the problem of attacks on strategic space systems continued to increase, we realized there was no single place to which one could turn for information about what might be happening, either to our adversaries' satellites or to our own. For example, warning satellites were run by SAC, one of the communications satellites was run by a separate DOD agency and another by Air Force Systems Command. One could go on at length with other examples of the extent of our fragmented operation and control of satellites (51:6).

The issue was that of fragmented control of US space-based systems. Such fragmentation was evident in the number of military agencies managing space-based systems. The weakness of fragmentation of effort presented itself in space operations, in budget competition, in interoperability issues, in duplication of effort, in space system vulnerability, and in its effect on the command and control of multi-service forces.

Improvements in space technology had led to the dependence of all services on space systems for accomplishing their missions. The awareness of the role of Space Division, the vulnerabilities of US space systems, and the fragmentation of US

space efforts led the various unified and specified CINCs to support the idea of a unified space command. The CINCs understood the US dependence on its space systems and realized their need for an organization that could operationally employ space systems in the interest of national security. As explained by Vice Admiral Ramsey, "Technological breakthroughs have made space indispensable to civil, commercial and military users. This maturing process was the driving force behind forming a separate military command to operate and control space systems that needed no further research and development, and were ready for operational employment" (57:9). This organization was established as the US Space Command.

Chapter Five

THE SOVIET SPACE THREAT

The Soviets claim their "space program is wholly peaceful in nature, dedicated to scientific and economic pursuits" (42:1). The purpose of this chapter is to show that this is not true. In fact, the Soviet space program represents a significant military threat to the US, and a unified space command was necessary to address that threat. To show the military nature of their space program, Soviet military space doctrine and space program organization will be assessed along with launch capabilities, budget, and research efforts. Specific Soviet space systems and capabilities will then be described to promote a better understanding of the military use of these systems. And finally, the need for a unified space command will be discussed.

SPACE DOCTRINE AND ORGANIZATION

Examination of Soviet military space doctrine and the organization of the Soviet space program underlines the military nature of Soviet space capabilities. According to a Defense Intelligence Agency (DIA) report of August 1984, Soviet military space doctrine is "compatible with, as well as subordinate to, general Soviet military doctrine" (42:32). It emphasizes superior, offensive military force and "recognizes the combined arms approach to combat operations" (42:32). Specifically, Soviet military space doctrine is assessed by DIA as follows:

> The Soviet Armed Forces shall be provided with all resources necessary to attain and maintain military superiority in outer space sufficient both to deny the use of outer space to other states and to assure maximum space-based military support for Soviet offensive and defensive combat operations on land, at sea, in air, and in outer space (42:vii).

With this doctrine in mind, a look at the organization of the Soviet space program also shows its military nature. The space program is controlled by the Communist Party. At the head of the space organization is the Defense Council, a part of the Politburo. Responsibility for actual program management is held by the Military Industrial Commission. They are responsible for

"coordinating the activities of all entities involved in the production of space systems" (42:26). The State Committee on Science and Technology, the USSR Academy of Science as well as other non-military organizations contribute to the Soviet space program. Their influence, however, appears to be minor in comparison with that of the Soviet military (42:28). "All five components of the Soviet Armed Forces [Strategic Rocket Forces, Army, Air Force, Air Defense Forces, and Navy (7:33)] are involved in the development and operation of the Soviet space program" (42:28). The Strategic Rocket Forces are responsible for space launches, satellite tracking, space payload recovery, and all logistic support for the space program. The Air Force has a heavy involvement in the manned space program and is responsible for Cosmonaut training. Soviet Air Defense Forces are also responsible for space defense. The Army and Navy, although less involved in the space program than the other services, also rely heavily on support from space systems to accomplish their missions (42:28). As this analysis has shown, the organization and management of the Soviet space program is primarily military in nature with overall control and direction maintained by the defense council. "The civilian, scientific, and economic aspects of the program are entirely subordinate to the military functions" (42:1).

BUDGET, LAUNCH CAPABILITY, AND RESEARCH

The Soviet space budget, launch capability, and research efforts are extensive and continue to grow. Estimates of the cost of the Soviet program are $20 to $25 billion a year in US dollars (14:4). In contrast, the fiscal year 1985 US Department of Defense space expenditure was $12.9 billion (27:1). From 1979 to 1983 the Soviets spent an average of 1.5 percent of their gross national product (GNP) on space activities. During this same period, US space expenditures averaged about 0.35 percent of US GNP (11:47). What is important to understand from these figures is not just how much is spent but to recognize the priority the Soviets place on their space program. Soviet space launch capabilities far exceed those of the United States. They have launched more satellites than the US every year since 1967. In 1984, the Soviets launched 97 satellites compared to 22 launched by the US (13:1). But what is more remarkable and enlightening about the Soviet capability is that in 1984 on 25 occasions they conducted two space launches within 24 hours. In addition, in June 1984 the Soviets launched three satellites in only 12 hours. And what was particularly impressive about this triple launch was that they launched three entirely different types of satellites (one navigation, one communications, and one reconnaissance) using three different families of launch vehicles. Then, between 21 and 28 June, they made a multiple launch of six satellites (13:2). To support these launch rates, the Soviets have developed and retain eight different space launch

boosters capable of launching payloads ranging up to 19,500 kilograms. They are also developing two additional boosters, with the largest, increasing their payload capacity to 150,000 kilograms. A shuttle orbiter similar to the US shuttle is also being developed. These boosters are launched from three launch sites: Kapustin Yar, Tyuratam, and Plesetsk (13:6; 44:56). When viewed from a military perspective, these high launch rates show the Soviets strong launch and support infrastructure as well as their large experience base. This gives them the capability, at any time, to quickly increase the number of on-orbit military space systems and to rapidly replace lost or damaged satellites during a crisis or conflict. To improve and expand these impressive space capabilities, the Soviets have a substantial research and development (R&D) organization. They graduate 300,000 engineers a year and employ 900,000 scientists and engineers in R&D. Since 1975 their R&D capability has grown approximately 28 percent and presently accounts for 20 percent of their annual military budget (20:2). The Soviet space budget, launch capability, and research effort far exceed those of the US and continue to grow. Their extensive launch and support infrastructure provides them assured access to space and their large budget and research effort shows their resolve to retain that access.

SPACE SYSTEMS

Specific Soviet space systems and capabilities further substantiate the military nature of their space program. Approximately 120 operational satellites are maintained in orbit by the Soviets to provide the following military support: "reconnaissance and surveillance; command, control, and communications; ICBM launch detection and attack warning; strategic and tactical targeting; navigation support; meteorological support; and antisatellite operations" (43:46). Most threatening are the Soviet antisatellite systems. They presently have four systems with antisatellite capabilities. They developed and still possess the world's only operational space weapon. Operational since 1971, their ground-launched, co-orbital antisatellite system can attack target satellites in orbits up to 5,000 Km. (13:36; 44:55). A second potential antisatellite weapon is their Galosh antiballistic missile system. This system was not specifically designed for the antisatellite mission but its inherent capabilities make it usable against low altitude satellites. Missiles can be launched from their deployed area around Moscow and from the antiballistic missile test range (13:37). Another potential antisatellite system consists of two ground-based laser facilities operating at the Sary Shagan test range. One of these sites is over 10 years old. The exact lethal range of the lasers is not known but it is estimated that they would be effective against satellites in orbits up to 1,000 Km (13:37; 56:10). American and British satellites "have already suffered

temporary anomalies within the vicinity of Sary Shagan which could have been caused by low-power laser radiation" (13:37). The fourth and final Soviet system capable of antisatellite operations is their electronic warfare (EW) system. In the Soviet Military, EW plays a prominent conventional role. "EW techniques include jamming uplink and downlink transmissions or even wresting control of the satellite away from its owner" (13:37). This last technique may have already been used against an American satellite. Theoretically, the range of EW is unlimited and could be effective against satellites in all orbits (13:37). Antisatellite systems are the most obvious military use of Soviet space systems but they also have other systems designed for direct military application. For example, they have two types of ocean reconnaissance satellites: the Electronic Intelligence Ocean Reconnaissance Satellite (EORSAT) and the Radar Ocean Reconnaissance Satellite (RORSAT). These two satellites are used together to detect, identify, locate, and target opposing naval forces (44:58). These Soviet space systems are clearly a significant and growing threat to US space systems and military forces.

As this analysis has shown, the Soviet space program is overwhelmingly military in nature. Over 90 percent of their space systems are used to support the military (43:46). Their military space doctrine requires Soviet military superiority in outer space, denial of space to other states, and space-based support for Soviet combat forces on land, at sea, in air, and in outer space. To support this doctrine, the Soviet space program already includes several antisatellite systems that can partially assure the space control portion of their doctrine and they have an intensive research and development program to enhance their capability to perform this mission. An extensive launch and support infrastructure is used for assured access to space and they have space-based systems to target enemy terrestrial forces, as well as, provide force enhancement support to Soviet terrestrial forces.

US SPACE COMMAND

The Soviets would have the US believe that their space program is entirely peaceful. They claim that they do not have any military interest in space (42:1). But, according to the DIA "the Soviet space program is not only overwhelmingly military in nature, but the civilian, scientific, and economic aspects of the program are entirely subordinate to the military functions" (42:1). By looking at Soviet military space doctrine and Soviet space program organization, budget, research, systems, and capabilities this analysis has shown that the Soviet space program is not just for peaceful purposes but in fact poses a significant military threat to the US. The recognition of the Soviet space program as a significant and growing mili-

tary threat and the need to develop an organization to counter that threat was one of the reasons for the establishment of US Space Command. In a recent speech General Robert T. Herres, Commander in Chief of US Space Command, made the comment that "one reason for forming the unified US Space Command was recognition of the Soviet's growing military capabilities in space" (20:2). An organization was needed that could monitor and assess the Soviet space order of battle as well as monitor, assess, and control the US space order of battle. In addition, since the Soviets have operational antisatellite space weapons and the US military has become dependent on space systems, the organization established needed to be able to perform the space control mission described in Chapter Six. These are warfighting missions and needed to be assigned to a unified space command rather than to a service space command. US Space Command was established, in part, to perform these missions. Chapter Seven will describe the specific US Space Command organizational elements established to counter this large and growing threat.

Chapter Six

US SPACE COMMAND

In Chapters Two through Five the major factors that led to the formation of US Space Command were discussed. This chapter presents a description of US Space Command (USSPACECOM), its organization, and missions. It also discusses the command's service components as well as its relationships with the Strategic Defense Initiative Office (SDIO), the North American Aerospace Defense Command (NORAD), and other unified and specified (U&S) commands.

ORGANIZATION

USSPACECOM was activated on September 23, 1985, as a unified command of nearly 12,000 personnel worldwide. Its headquarters, which is authorized approximately 600 of those personnel, is located in Colorado Springs, Colorado and is collocated with two other headquarters, Headquarters Air Force Space Command and Headquarters NORAD. About half of USSPACECOM's headquarters personnel are Air Force, about 30 percent are Navy and Marine Corps, and the remaining 20 percent are Army (55:6). Like other unified commands, USSPACECOM has several service components. Air Force Space Command is the Air Force component and the Naval component is the Naval Space Command with its headquarters at Dahlgren, Virginia. Functioning as the Army component is the Army Space Agency which is also collocated in Colorado Springs (31:22). The organization and missions of the components will be discussed later in this chapter.

Headquarters USSPACECOM is organized similar to other unified commands with the commander in chief (CINC) and deputy commander in chief (Dep CINC) from different services. At this time the CINC is an Air Force General and the Dep CINC is a Navy Vice Admiral. The USSPACECOM CINC is also dual hatted as CINC NORAD and the Dep CINC is dual hatted as Vice CINC NORAD. Even though the CINC and Dep CINC are dual hatted, there are separate and distinct staffs for both commands (56:4).

Air Force Space Command is the host command and provides the following staff functions for USSPACECOM: comptroller, inspector general, command surgeon, legal advisor, chaplain,

security police, protocol, administration, and public affairs. Headquarters USSPACECOM has the typical "J" staff organization found at most unified commands with the notable exception of a combined J4 and J6. J staff missions, responsibilities, and organization will be described in the following paragraphs.

J-1 is the directorate of manpower and personnel and the director's billet is an Air Force colonel. Its mission is to "provide manpower and personnel support to USCINCSPACE and CINCNORAD. Coordinate staff personnel matters and exercise staff supervision of joint personnel, manpower, and related activities" (29:27). Specifically, J-1 is responsible for personnel requisitioning and assignments, policy guidance on personnel and manpower management matters, manpower and personnel annexes to unified operational plans and contingency plans, the joint service awards program, civilian personnel policy matters, and studies as required for development or modification of joint manpower documents. The directorate has three deputy directorates: manpower and organization, plans and policy, and joint services management (29:27).

J-2 is the directorate of intelligence and the director's billet is an Air Force brigadier general. Its mission is to provide "adequate and timely intelligence support to USCINCSPACE and ensure the availability of the intelligence necessary for the USSPACECOM mission" (29:32). Specifically, J-2 is responsible for advising the CINC and his staff on all matters pertaining to intelligence; providing intelligence estimates of the threat to North America and to US/Allied space systems, and providing warning of enemy hostile actions or intentions; providing effective management of intelligence supporting functions; and formulating intelligence policies, programs, and plans. The directorate has two deputy directorates: plans and programs, and operations (29:32).

J-3 is the directorate of operations and the director's billet is a Navy rear admiral upper half (O-8). J-3 is responsible for executing approved operations and contingency plans; preparing and coordinating all current operations planning documents; and providing overall employment direction of USSPACECOM assets and resources for space operations, space defense, and all warning and surveillance assets. The directorate has nine deputy directorates: space operations; space control; missile warning; command, control, and communications; command and control countermeasures; weather; operations, plans, and requirements; exercises; and special activities. In addition, J-3 has four operations centers: the Space Surveillance Center, the Space Defense Operations Center, the Missile Warning Center, and the Space Operations Center, which functions as a space command post (29:37).

Because the USSPACECOM mission is highly dependent on computers, systems integration, and communications, the usual J-4 and J-6 directorates were combined to form one directorate, J-4/6, designated as systems integration, logistics, and support (56:5). The J-4/6 director's billet is an Air Force major general. J-4/6 is responsible for formulating and implementing joint policies, concepts, and procedures to ensure effective use of command and control systems and associated logistics support; ensuring technical integration of long-range plans for space operations and integrated tactical warning systems; advocating system improvement and research and development efforts for operational application; and supporting and participating in joint exercises and unified planning activities. The directorate has three deputy directorates: system integration, operational plans, and plans and requirements (29:48).

J-5 is the directorate of plans and the director's billet is an Army major general. Its mission "is to develop plans, policy, doctrine, strategy, and operational requirements for USSPACECOM" (29:51). Specifically, J-5 is responsible for planning for integrated attack warning and assessment, and space operations; developing policy on the missions, functions, and responsibilities assigned to USSPACECOM; developing, evaluating, coordinating, monitoring, and sustaining joint doctrine, strategy, and operational requirements for strategic defense and space operations; monitoring compliance with and recommending changes to the Joint Strategic Planning System documents and the Unified Command Plan; monitoring component Planning, Programming, and Budgeting System (PPBS) activities to ensure consistency with USSPACECOM requirements; supporting the CINC during Defense Resources Board (DRB) deliberations and the Program Objectives Memorandum (POM) issue cycle; analyzing joint exercises, concepts and operational plans, and providing analytical support for simulations and war gaming; providing advice on command relationships, arms control and international negotiations, including the NORAD agreement; coordinating strategic aerospace defense and space operations activities with the Office of the Secretary of Defense (OSD), Organization of the Joint Chiefs of Staff (OJCS), joint program offices, military services, other unified and specified commands, and other government agencies. The directorate has five deputy directorates: space operations, ballistic missile defense planning, surveillance and warning, analysis, and plans and policy (29:51).

MISSIONS

USSPACECOM's purpose is to operationally employ our military space assets. The command's assigned missions are "space operations, surveillance and warning, and ballistic missile defense planning" (54).

Space operations includes two broad areas, space control and space support. Space control is the command's warfighting mission and includes ensuring access to space for ourselves and denying access to space to our adversaries during hostilities. This involves monitoring, assessing, and informing operators of threats against space systems, defending friendly space systems, and eliminating hostile space systems (56:7). Defending friendly space systems requires more than just protecting the satellite. Defense of the ground-based launch, control, and user segments is just as essential as defense of the satellite (56:10).

The space support portion of the space operations mission includes two categories. The first is space system support and the second is support to the users. Space system support includes launching, monitoring, and controlling space systems. Support to the users "means operating Joint Chiefs of Staff (JCS) designated space systems in support of the National Command Authorities, JCS, and U&S commands" (54:--). This support includes communications, navigation, surveillance, and environmental monitoring. "In addition, USSPACECOM is responsible for ensuring the space system requirements of other U&S commands are supported and for advocating needed space support capabilities" (54:1).

The next mission to be looked at is surveillance and warning. It includes providing missile warning and space surveillance to fulfill the US commitment to NORAD and "to CINCs having ballistic missile and space attack warning requirements affecting areas other than North America" (16:4). This mission also includes "providing integrated tactical warning and assessment of space, missile, and air attacks on the continental United States" (54:--). This latter mission is a responsibility of NORAD and therefore will be performed by USSPACECOM only when NORAD is unable to perform it (16:5).

USSPACECOM's last mission is planning and developing requirements for defense against ballistic missiles during strategic conflict (54:--). Ballistic missile defense planning involves all U&S commands. USSPACECOM's role is to act as coordinator and integrator and to develop a concept of operations (56:25).

COMPONENTS

To accomplish its assigned missions USSPACECOM has three service components. It's component commands are the Air Force Space Command and the Naval Space Command. The Army does not have a space command, serving as its component is the Army Space Agency.

Air Force Space Command is both a major command of the Air Force and the Air Force component command of USSPACECOM (16:5). It was established in 1982 to consolidate Air Force space activities and became a component command when USSPACECOM was formed in 1985. The command is responsible for operating assigned military space systems and for organizing, training, equipping, and administering forces in support of NORAD and USSPACECOM (27:1).

Air Force Space Command's mission is to "manage and operate assigned space assets, consolidate requirements, provide operational advocacy, and ensure a close interface between research and development activities for space systems" (27:2). As an Air Force major command it also has the additional mission of supporting US aerospace defense (27:2).

The command's headquarters is on Peterson Air Force Base (AFB) in Colorado Springs, Colorado. It has approximately 11,000 military, civilian, and contractor personnel stationed at 28 facilities and installations worldwide (16:5). Subordinate organizations include the 1st, 2nd, and 3rd Space Wings.

The 1st Space Wing is responsible for the operation of missile warning and space surveillance sensors worldwide. These sensors are part of a sensor network that provides "missile warning, space surveillance, intelligence, communications, and weather data for the Department of Defense (DOD)" (24:1). 1st Space Wing headquarters is at Peterson AFB.

The 2nd Space Wing, at Falcon Air Force Station, Colorado, manages the Consolidated Space Operations Center (CSOC) and is responsible for the operation of assigned military space systems (16:5). The wing also "supports the National Aeronautics and Space Administration (NASA) in the management and control of the space shuttle" (26:1). In the future they will manage and operate the Air Force Satellite Control Network (26:1).

2nd Space Wing's CSOC has two major components, the satellite operations complex (SOC) and the shuttle operations and planning complex (SOPC). The SOC performs "tracking, telemetry, and command of orbiting spacecraft" and it is planned that the SOPC will "conduct flight planning, flight readiness, and on-orbit control for DOD shuttle missions" (26:2). The SOC "will be compatible with Air Force Systems Command's Satellite Test Center at Onizuka Air Force Station, California" and the SOPC will be "compatible with NASA's Johnson Space Center" (26:2) in Houston, Texas.

Peterson AFB is also the location of the 3rd Space Support Wing headquarters. This wing is "responsible for operating the military facilities [nurseries, commissaries, etc.] at Peterson AFB, Colorado; Falcon AFS, Colorado; the Cheyenne Mountain Com-

plex, Colorado Springs, Colorado; Sondrestrom and Thule ABs in Greenland; and at locations in Australia" (4:1).

The Naval Space Command, established October 1, 1983, is the Naval component command of USSPACECOM. Its headquarters is at Dahlgren, Virginia (23:1). The command's mission is to provide, operate, and maintain space resources supporting naval units worldwide, coordinate naval requirements for the use of space capabilities and resources, and support the development of operational requirements for current and future space support (8:6; 28:2).

Three operational subordinate units are assigned to the command, the Navy Astronautics Group at Point Magu, California, the Naval Space Surveillance System collocated with the headquarters at Dahlgren, and the Fleet Surveillance Support Command at Northwest, Virginia. The Navy Astronautics Group is responsible for operational control of the Navy's satellite navigation system, TRANSIT (45:15). The Naval Space Surveillance System operates a network of space surveillance sensors that identify and track space vehicles and provide satellite vulnerability reports to the fleet (28:5). In addition, they function as the USSPACECOM Alternate Space Surveillance Center (23:1). The Fleet Surveillance Support Command will operate the Navy's Relocatable Over-the-Horizon Radar systems.

Representing the Army as a component element of USSPACECOM is the Army Space Agency, activated on August 1, 1986 in Colorado Springs, Colorado (3:1; 32:2). The agency does not have any operational forces assigned at this time, but is preparing for the future assignment of operational forces. Their responsibilities include providing an Army perspective in planning and operations of defense space programs, strategic defense planning, and ensuring space systems support to Army forces worldwide (3:1; 30:--).

RELATIONSHIPS

To better understand how the command accomplishes its missions, this section discusses USSPACECOM's relationships with the SDIO, NORAD, and other U&S commands.

USSPACECOM does not exercise any control over the SDIO. Their responsibilities are separate but complementary. USSPACECOM is responsible for planning and developing requirements for ballistic missile defense and the SDIO is responsible for researching technologies to determine if they could be used for ballistic missile defense (46:2). In addition, some of the technologies developed by the SDIO may be useful for other USSPACECOM missions. For example, they may be able to use some of the technologies to improve the sensors used for the surveillance and warning mission (41:4).

USSPACECOM has a unique relationship with NORAD. NORAD's mission "is to provide surveillance and control of the airspace of Canada and the United States, provide appropriate response against air attack, and provide warning and assessment of aerospace attack" (25:1). NORAD has responsibility for surveillance, warning, and assessment for all three areas of aerospace (air, missile, and space), but it only has engagement responsibility for air. USSPACECOM provides the missile warning and space surveillance force structure necessary to perform NORAD's warning and assessment mission (16:5; 52:12).

U&S commands are provided several kinds of support. USSPACECOM operates current systems to provide support for surveillance, navigation, communications, and environmental monitoring (40:8; 41:3). It ensures U&S commands' space system requirements are advocated and supported. It provides launch and control of space systems required to support U&S commands (54:--). Finally, it provides missile warning and space surveillance to CINCs having ballistic missile and space attack warning requirements affecting areas other than North America. This completes the discussion of USSPACECOM and the primary factors that led to its establishment. Next, Chapter Seven will look at how well the command's organizational structure supports US space requirements.

Chapter Seven

DOES US SPACE COMMAND ORGANIZATION SUPPORT MILITARY SPACE REQUIREMENTS

Many factors relating to US national interests, objectives, policies, capabilities, and concerns were instrumental in shaping the organization of the new US Space Command. The overall objective of this report is to analyze the major factors that led to the formation of USSPACECOM, and then to examine how well the USSPACECOM organization supports these requirements. Chapters Two through Five examined and described four of the primary factors that led to the command's formation, US space policy, US military space doctrine, space technology and US dependence on space systems, and finally, the Soviet space threat. Chapter Six presented a detailed description of US Space Command's organization, missions, service components and relationships. This chapter will examine how well the US Space Command organization described in Chapter Six supports those factors described in Chapters Two through Five. The format used to accomplish this is to present a summary of the important requirements from Chapters Two through Five along with a description of how well each is supported by the US Space Command organization, and then a discussion of the shortfalls.

POLICY

United States space policy, as described in Chapter Two, has always been guided by the premise that space should be used for peaceful purposes. This premise is held in support of US national values, interests, and objectives. To continue its proper support of US values, interests, and objectives for the future, US space policy was required to undergo a change in direction in the early 1980s. The use of space would now be dominated by its need to enhance national security. Peaceful activities would include those required to support national defense. US space policy now requires assured access to space, achieving a level of survivability for space assets equal to the value of support they provide, and space support to the Strategic Defense Initiative (SDI). These elements made policy one of the factors leading to the formation of USSPACECOM. It is these elements of policy that can be used to determine whether the US Space Command is organized to support US space policy.

The stated goals of US space policy have not been reached, but the US Space Command organization and its missions will allow it to support these goals as the command develops. Assured access includes a number of areas, the primary being launch capabilities. USSPACECOM's missions make it responsible for determining launch requirements and priorities for assigned systems. It is also heavily involved in managing and advocating the programs that will provide launch assets for the future. With USSPACECOM's assistance and support, funding is now programmed for boosters and upper stages for expendable launch vehicles to complement the Space Shuttle (50:3). In addition, a joint study is underway by USSPACECOM and the Space Division of Air Force Systems Command (AFSC) for the development of a second-generation space transportation system. USSPACECOM's responsibilities include identifying functional needs such as survivability, reliability and quick response launch strategies (50:4). The survivability element of US space policy includes both ground and space segments. Survivability is a long-term program, but one which USSPACECOM can manage most effectively as a centralized command. Recently launched systems and those currently in procurement incorporate such features as nuclear hardening, anti-jam capabilities, encryption, and on-orbit spares. Ground elements are being enhanced through the use of mobile systems and increased physical security measures. As the operational command for these systems, USSPACECOM can ensure that survivability remains a firm operations requirement in the design of all future systems. With regard to the requirement to support the Strategic Defense Initiative, USSPACECOM is currently able to provide only a limited level of support. SDI, in its present state, is a technologies research effort and must be fairly free of close operational guidance (50:10). However, there is a strong relationship between the two organizations. This will permit USSPACECOM to contribute to the development of ballistic missile defense requirements, and when the time arrives assist in evaluating potential deployment strategies. The US space policy goals of assured access, survivability, and support to SDI have not been reached. However the formation of an operational military space organization, USSPACECOM, is a step in the right direction. The J-5 staff is responsible for developing policy. In addition, J-5 develops and coordinates joint strategy and operational requirements for both space operations (assured access, survivability) and strategic defense (SDI). The USSPACECOM organization provides the means to support US space policy to the fullest extent possible at this time. In the future, USSPACECOM will be able to improve its support to US space policy as it matures and gains experience in these new mission areas.

DOCTRINE

US military space doctrine requires the operational employment of space systems to support military forces and to control space. A unified command was required, by law, for operational employment and to support the warfighting operational mission of space control. This made space doctrine a factor in the formation of the USSPACECOM.

USSPACECOM has the organizational structure to provide for operational employment of space systems in support of military forces. Its combat operations staff, part of the J-3 directorate, mans the command's mission operations centers. These various centers support CINCSPACE in the control of the use of space systems and space defense. They identify and track all objects in space, and have operational responsibility for the defense of US space systems, including control of the US antisatellite (ASAT) system still in development. USSPACECOM will have operational control of the US ASAT if it becomes operational. The centers and their supporting sites and control networks also provide USSPACECOM with the ability to operationally control existing US space systems in support of operational requirements. USSPACECOM's centralized control allows it to support the doctrinal warfighting principles of unity of command and economy of force. The command's support of these principles will increase as experience is gained in controlling current and future space systems. Space control is not enforceable today. The space surveillance network is in operation, but there is no weapon system that could gain and enforce control. This issue can be addressed by USSPACECOM. USSPACECOM has the organizational structure that allows it to guide the advocacy, development, deployment, and the ultimate employment of systems in support of this doctrine. The J-5 directorate of USSPACECOM is being guided in its efforts for the future by the doctrine of space control.

TECHNOLOGY AND DEPENDENCE

Technological improvements in space systems led to an increased use of them and to a growth in the US dependence on space systems. Now, dependence of the United States on deployed space systems for national security is a fact. Awareness of the extent of dependence led many defense and government elements to call for the formation of a unified space command, making this issue a factor in the formation of the USSPACECOM. The primary concerns were the need to transfer operational systems from the R&D arena to an operational organization, fragmentation of US space efforts, and the vulnerabilities of US space systems.

Through its component commands, the USSPACECOM is now operating and controlling operational space systems. These include the Defense Meteorological Satellite Program, the Satel-

lite Early Warning System, the NAVSTAR Global Positioning System, TRANSIT, and FLTSATCOM. USSPACECOM will also be assuming responsibility for systems to be deployed, such as the Milstar satellite system, currently in development. Fragmentation of space efforts, evidenced by a lack of interoperability among the services, is also being addressed by USSPACECOM. As the focal point for existing and developing space systems, USSPACECOM is ensuring that interoperability is properly addressed in future designs. This is accomplished as the USSPACECOM interfaces with the Air Force Systems Command, the unified and specified using commands, and the operating commands of the Air Force and Naval Space Commands. The concern over vulnerabilities, expressed by the unified and specified CINCs, has not been eliminated. However, the USSPACECOM's space operations center provides a focal point for the crisis and battle management of US military space systems. USSPACECOM is also able to address vulnerabilities as it guides requirements for new systems and improvements to fielded systems.

SOVIET SPACE THREAT

How effective is the new USSPACECOM organization against the Soviet space threat? As discussed in Chapter Five, the Soviet space program is overwhelmingly military in nature and poses a significant military threat to the US. Recognition of this threat and the need to establish an organization to counter it was one of the major factors that led to the formation of USSPACECOM.

USSPACECOM has several organizational elements that significantly improved the US ability to counter the Soviet space threat. Probably the most important was the establishment of a "space command post" called the Space Operations Center (SPOC). The SPOC directly supports the CINC and provides him the capability to monitor and assess the Soviet space order of battle, and to monitor, assess, and control the US space order of battle to include control of space systems and their defense. The SPOC also provides direct links to two other important operational elements of the organization, the Space Defense Operations Center (SPADOC) and the Space Surveillance Center (SSC). The SPADOC has operational responsibility for defense of US space systems which includes control of the US antisatellite system. The SSC is responsible for the identification and tracking of all objects in space. In addition to these operational centers, USSPACECOM established a directorate for space intelligence and a deputy directorate for space control. They established a deputy directorate for exercises to ensure the space threat is considered in military exercises and are developing a contingency plan for the use of civilian space systems during national emergencies. With the command's support, the US aircraft launched antisatellite system is being completed and several new

expendable space launch vehicles are being developed to improve our access to space. This USSPACECOM organization is providing the infrastructure that allows the DOD to consolidate and integrate US space forces into a single, joint military organization that is much more responsive to the Soviet threat. The overall assessment is that the present USSPACECOM organization should counter the current Soviet space threat very effectively and no organizational changes should be necessary in the near future.

ORGANIZATION SHORTFALLS

Organizational elements for defense against ballistic missiles and for handling military astronauts are missing from the present organizational structure. Ballistic missile defense will be addressed first. One of USSPACECOM's missions is to plan and develop requirements for defense against ballistic missiles during strategic conflict. Their stated role is to act as coordinator and integrator and to develop a concept of operations. USSPACECOM is also responsible for surveillance, identification, warning, and assessment of the ballistic missile threat (45:5). But who is responsible for ballistic missile defense? NORAD is responsible for defense against the air threat and USSPACECOM is responsible for defense against the space threat but neither is responsible for ballistic missile defense. The same command responsible for performing ballistic missile defense should also be responsible for developing the requirements, plans, and concept of operations for that defense since they will have to implement them. USSPACECOM and its components do not have forces to accomplish this mission. It is recommended that the ballistic missile defense mission be assigned to USSPACECOM along with the forces necessary to accomplish this mission.

Another problem area is the lack of an organization for military astronauts. In the future, military shuttle operations are going to be planned and operated by USSPACECOM instead of NASA. To accomplish this, a shuttle operations and planning complex (SOPC) is already planned by Air Force Space Command, a component of USSPACECOM. An organization should also be established as part of USSPACECOM to manage military astronauts to fly these military shuttle missions.

In addition to organizational issues, another issue that needs to be pursued is the transfer of space systems responsibilities to USSPACECOM now that the command is fully operational. For example, channel allocation on the Milstar satellite communications system is controlled by the JCS. This responsibility should be transferred to USSPACECOM. A similar situation involves the Defense Satellite Communications System (DSCS). DSCS is controlled and operated by the Defense Communi-

cations Agency (56:19). These responsibilities should also be transferred to USSPACECOM. Since the command is new it will take a while for all of the bits and pieces of the US military space system to be transferred to it, but this should be done as soon as possible to ensure the system is controlled efficiently and effectively.

CONCLUSION

The potential for space to become a hostile environment is growing because of the increasing dependence of US operational forces on space systems for vital support and because the technology for space conflict is maturing (22:56). The formation of USSPACECOM addressed the present US military space organizational requirements. All of the factors examined in this report support the need for a unified space command. As presently organized the command should do an excellent job of supporting these factors except in the areas of ballistic missile defense and military astronaut management as discussed earlier.

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